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Associations among Impulsivity, Trauma History, and Alcohol Misuse within a Young Adult Sample

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Abstract

Objective—Young adult alcohol misuse is associated with numerous long-term adverse outcomes. Given the link between impulsivity and alcohol use, we examined whether three impulsivity-related traits differentially predicted number of drinks per drinking day (DDD). We also examined whether these effects varied for those with different trauma histories.

Method—The current study (n=254) examined motor, non-planning, and attentional impulsivity as predictors of DDD. It also examined whether impulsivity was differentially predictive of DDD across individuals in: a control group (non-trauma exposed), a trauma exposed but non-PTSD group, and a PTSD group.

Results—Regardless of group, more motor impulsivity was associated with more DDD. The effect of non-planning impulsivity varied according to trauma history. Specifically, more non-planning impulsivity predicted more DDD for those without PTSD. Finally, attentional impulsivity was not predictive of DDD.

Conclusions—Young adults with high levels of motor impulsivity, regardless of trauma history, may be a particularly high-risk group in terms of propensity for alcohol use/misuse. Additionally, high levels of non-planning impulsivity may signify those at greater risk for alcohol misuse,

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among those without PTSD. Motor impulsivity and non-planning impulsivity may serve as useful intervention targets in alcohol misuse prevention efforts. Implications for future research in this area are discussed.

Keywords

trauma; PTSD; impulsivity; alcohol use; young adulthood

1. Introduction

Recent meta-analyses indicate that multiple personality traits implicated in rash or impulsive behavior are consistently associated with alcohol use (Coskunpinar & Cyders, 2013; Stautz & Cooper, 2013). As with impulsivity, trauma history and posttraumatic stress disorder (PTSD) often co-occur with problematic alcohol use (Mills et al., 2004; Pietrzak et al., 2011; Pine & Cohen, 2002). However, it is unclear if this link between impulsivity and alcohol use differs by trauma history or PTSD diagnostic status. Given the costs and burden of alcohol misuse among high risk populations (e.g., young adults with trauma history) and the potential prevention and intervention implications that may subsequently extend from further elucidating the associations among impulsivity, alcohol misuse, and PTSD (as well as trauma exposure), further research in this area is clearly warranted (Dvorak, Pearson, & Day, 2014; Simpson et al., 2014). To clarify these complex associations, the current study examined the relations between multiple impulsivity-related traits and alcohol use for those without trauma history, those who have experienced trauma but who do not have PTSD, and those who have PTSD.

1.1 Impulsivity and Alcohol Use

Impulsivity is a complex construct. Several traits or dispositions may predispose individuals towards impulsive behaviors, including risky or maladaptive alcohol use. Relations between alcohol use outcomes and impulsivity vary based on how each is measured and operationalized (Coskunpinar & Cyders, 2013; Dick et al., 2010; Stautz & Cooper, 2013). Patton and colleagues (1995) conducted factor analyses on the Barratt Impulsiveness Scale Version (BIS-10) to examine different components of impulsivity. Their findings yielded three higher order factors (see Appendix A), including *motor impulsivity*, *non-planning impulsivity, and attentional impulsivity*. Individuals high on motor impulsivity tend to act on the spur-of-the-moment without thinking, they tend to respond quickly, and appear restless. Those high on non-planning impulsivity tend to focus more on the present and have difficulty with self-control related to future planning and forethought. Finally, the construct of attentional impulsivity captures an individual's difficulty controlling his/her thought processes, as well as staying focused and attending to one task or idea.

There is an association between substance use and impulsivity traits linked to a tendency to act without thinking and a lack of forethought and deliberation (i.e., motor and non-planning impulsivity; Adams, Kaiser, Lynam, Charnigo, & Milich, 2012). Behaviorally, individuals who engage in heavy episodic drinking are more likely than those who do not to have difficulty inhibiting their response when in the presence of an immediate reward, indicating more motor impulsivity among heavy episodic drinkers (Lyvers, Czerczyk, Follent, &

Lodge, 2009). One study found that non-planning impulsivity was associated with number of drinks per month among college students (Caswell, Celio, Morgan & Duka, 2016). Prior work has failed to find a link between attentional impulsivity and alcohol use (Handley et al., 2011), however, underscoring the importance of considering multiple traits when examining associations between impulsivity and alcohol use.

1.2 Trauma Exposure, PTSD, and Alcohol Use

Impulsivity-related traits and behaviors appear to be elevated among those who experience traumatic events (Moore, Overstreet, Kendler, Dick, Adkins, & Amstadter, 2016; Netto et al., 2016) as well as among those who develop PTSD (Netto et al., 2016; Tull, Barrett, McMillan, & Roemer, 2007). In addition to impulsivity-related traits directly influencing alcohol use, it may also be that trauma exposure or PTSD moderates these effects. Prior work has found that individuals with trauma experience (Stappenbeck, Bedard-Gilligan, Lee, & Kaysen, 2013; Ullman, 2003) and/or posttraumatic stress disorder (PTSD) are at risk for engaging in more frequent alcohol use and alcohol use in larger amounts, compared to those without trauma exposure or PTSD (Stewart, Mitchell, Wright, & Loba, 2004). Individuals may use alcohol to cope with trauma-related sequelae (e.g., disruption of social connections; Pine & Cohen, 2002; Shin, Miller, & Teicher, 2013), with some finding the effect of trauma exposure on alcohol use is independent of PTSD symptoms (Fetzner, McMillan, Sareen, & Asmundson, 2011). Additionally, others have found that individuals use alcohol following trauma in order to cope with the negative emotions and anxiety associated with PTSD (i.e., self-medication; Dixon, Leen-Feldner, Ham, Feldner, & Lewis, 2009; Simpson, Stappenbeck, Luterek, Lehavot, & Kaysen, 2014). Thus the unique effects of PTSD and trauma exposure on alcohol use outcomes are unclear.

Additionally, to our knowledge, no one has studied whether trauma or PTSD moderates the effects of different impulsivity-related traits on alcohol use. However, some do find an interaction between impulsivity and PTSD-related alcohol expectancies. Specifically, in a sample of individuals with PTSD and substance use disorders, the effect of impulsivity (difficulty controlling behavior under conditions of negative affect) on alcohol use was moderated by PTSD-related alcohol expectancies (Schaumberg et al., 2015). Thus, those who are prone to impulsive action may be particularly likely to use alcohol if they are also experiencing significant trauma-related anxiety.

In terms of relations among trauma exposure, impulsivity and alcohol use, one group found that those who experienced childhood maltreatment reported elevated levels of an emotion-based facet of impulsivity (i.e., negative urgency), which was associated with alcohol use problems (Wardell, Strang, & Hendershot, 2016). Thus, those who are more prone to rash action may be most likely to use alcohol if they experience unpleasant emotions (e.g., sadness, isolation) that result from trauma-related sequelae such as disruption of social networks. However, it is unclear whether individuals who have trauma exposure without PTSD would have similar impulsivity-alcohol use pathways to those with PTSD or similar pathways to those without PTSD and no trauma exposure. The proposed analyses add to this existing literature by examining whether trauma or PTSD moderate the impact of

impulsivity on alcohol use in a community sample of individuals without substance use disorders.

1.3 Current Study

The current study provides an initial examination of the main effects of impulsivity-related traits as well as trauma exposure and PTSD, as well as interactions between impulsivity and trauma and PTSD in predicting alcohol use among young adult drinkers without substance use disorders. Although research suggests that individuals who are higher in motor and non-planning impulsivity are more likely to use alcohol, it is unclear whether the presence of trauma or PTSD amplifies the effects of impulsivity on alcohol use. The current study examines the effects of motor, non-planning, and attentional impulsivity on number of drinks consumed when drinking among three groups of individuals: trauma exposed with PTSD, trauma exposed without PTSD, and a non-trauma exposed control group.

It is hypothesized that motor impulsivity will be associated with number of drinks per drinking day (DDD). Individuals with PTSD who are also high in non-planning impulsivity may be more likely to start drinking to cope with their symptoms without considering future negative consequences of their drinking habits, and then have difficulty stopping drinking or controlling their drinking over time. These individuals with PTSD and high non-planning impulsivity may also have more alcohol-related problems in part due to the main effect of impulsivity, and the presence of PTSD (and using alcohol to cope) may amplify this effect. Thus, we hypothesize that the relation between level of non-planning impulsivity and DDD will be more robust among participants with PTSD. Consistent with previous literature (Handley et al., 2010), we hypothesize that there will be no significant association between attentional impulsivity and alcohol use. However, attentional impulsivity was included in the model to be inclusive of impulsivity-related traits assessed by the BIS-10.

2. Materials and Methods

2.1. Procedure

Two hundred and fifty-four young adults between the ages of 21 and 30 were recruited to take part in the larger experimental study examining associations between traumatic stress and alcohol use following an applied stressor in young adults. All variables used in the current study were assessed at the baseline visit of this larger study.

2.2. Participants

Descriptive statistics on the 254 participants are reported in Table 1. Participants were recruited through community advertisements and evaluated following consent to determine whether they were eligible to be included in the control group, trauma-exposed group, or PTSD group based on their responses to the Life Events Checklist (Gray, Litz, Hsu, & Lombardo, 2004), Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998), and PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993). These measures are validated instruments that assess mental health diagnoses and interpersonal traumatic experiences. Participants were recruited into one of three groups: a PTSD group, trauma-exposed group, and a control group. Each group had separate eligibility criteria.

Participants were eligible for the PTSD group if they experienced an interpersonal trauma and met *DSM-IV* criteria for PTSD. Participants were eligible for the Trauma Exposed (TE) group if they reported a history of interpersonal trauma but did not meet full diagnostic criteria for PTSD. Participants were eligible for the Control group if they did not experience interpersonal trauma and did not meet criteria for PTSD.

2.3. Measures

2.3.1. Covariates

Age: Young adult age was examined at baseline, the time of the laboratory visit when measures were completed (M=24.70, SD=2.59).

Sex: Women (59.5%) were coded 0 and men were coded 1.

Race: Individuals self-identified as either Caucasian (90.2%; coded 0) or African-American (9.8%; coded 1).

Parent Alcohol Problem: Given the work suggesting that parent alcohol use disorder impacts offspring risk for alcohol use (Chassin, Pillow, Curran, Molina & Barrera, 1993; Marmorstein, Iacano, & McGue, 2009; Walden, Iacano, & McGue, 2007), parental alcohol problem was used as a covariate. Specifically, young adults reported whether they believed that their mother or father had an alcohol use problem. Individuals who reported that they did believe their parent had a problem were given a score of “1” (33.9% endorsed) and those who did not were given a score of “0.” 2.3.2. Predictors

Impulsivity: In order to test the differential impacts of impulsivity-related traits, three scales from the Barrett Impulsiveness Scale (BIS) were used (Patton, Stanford, & Barratt, 1995). The BIS is the most widely published self-report measure of impulsivity. Factor analyses from Patton et al. (1995) indicate that three factors fit their data well. These factors capture: motor impulsivity (e.g. I act on the spur of the moment), attentional impulsivity (e.g. I don’t concentrate easily), and non-planning impulsivity (e.g. I plan for job security). Answer choices ranged from 1 (rarely/never) to 4 (almost always/always).

After grouping items into three impulsivity subscales to correspond with the three impulsivity-related traits identified in Patton et al. (1995)’s analyses, Cronbach’s Alphas were examined within each subscale and two of the three were found to be in an unacceptable range (i.e. <.7; alphas were .559, .626, and .720; Streiner, 2003). Therefore, items within each subscale that, when excluded, resulted in an increased alpha, were omitted. A total of five items from across the three scales were omitted. The resulting alphas were all within an acceptable range (i.e. .723–.792). See Appendix A for lists of both the included and omitted items. The result of these omissions are that the Motor, Attentional, and Non-Planning subscales are comprised of 8, 7, and 10 items, respectively.

Trauma History: Two dummy coded variables were created to capture membership in each of these three groups (i.e. control, TE, and PTSD) to afford specific comparisons: [TE and

PTSD] vs. Control to examine the effect of trauma exposure, and PTSD vs [TE and Control] to examine the effect of PTSD).

2.3.3. Outcome

Drinks per Drinking Day: The timeline follow-back (TLFB; Sobell & Sobell, 1996) assessed alcohol use quantity (number of standard drinks) and frequency (number of drinking days) over 90 days prior to the laboratory visit. Average DDD is often used in the literature (Irwin, Mogenstern, Parson, Wainburg, & Labouvie, 2006) to reflect an individual's propensity to engage in heavy episodic (i.e., risky) drinking (Babor et al., 1994; Kadden et al., 1998). Because this variable was somewhat positively skewed (at 2.12), we log transformed this variable. The resulting skew was much improved (.32). Both the original and log transformed DDD variables are presented in Table 1.

2.4. Data Analytic Plan

To reduce nonessential multicollinearity prior to conducting Ordinary Least Squares (OLS) regression analyses, continuous variables were centered (Cohen, Cohen, West, & Aiken, 2003). Missing data on endogenous variables were estimated as a function of the observed exogenous variables under the missingness at random assumption (Schafer & Graham, 2002). Data analyses were conducted using MPlus Version 7 (Muthen & Muthen, 1998–2011).

3. Results

3.1. Correlations

Table 2 provides the zero-order Pearson (between two continuous variables), Tetrachoric (two dichotomous variables), and Biserial (dichotomous and continuous variables) correlations among study variables. In terms of relations between covariates and outcomes, males reported more DDD than females. No other covariates were associated with DDD. In terms of relations between predictors and outcomes, there was a trend ($p<.1$) such that those in the trauma-exposed groups (TE and PTSD) reported more DDD than those in the control group. There was no association between PTSD diagnosis (PTSD vs. non-PTSD groups) and alcohol use. Additionally, more motor impulsivity and more non-planning impulsivity were associated with more DDD. There was a trend ($p<.1$) such that more attentional impulsivity was associated with more DDD. Finally, all three impulsivity scales were significantly correlated with one another.

3.2. Final Study Model

In carrying out an OLS regression model, age, race, gender and parent alcohol problems were entered as covariates, and dummy code 1 (comparing the control group to the two trauma-exposed groups), dummy code 2 (comparing the control and trauma-exposed group to the PTSD group), motor impulsivity, non-planning, and attentional impulsivity were entered as a priori predictors of DDD. All two-way interactions (i.e. between and among covariates and predictors) were also initially entered into the model. Any interactions that were non-significant ($p<.05$) were trimmed.

In predicting DDD, gender was a significant predictor (men > women). Additionally, there was a main effect of motor impulsivity, such that more motor impulsivity was associated with more DDD. There was a significant interaction between non-planning impulsivity and PTSD diagnosis in predicting DDD, where higher non-planning impulsivity was associated with more DDD for those *without* PTSD (b=.016, p<.05). No such relation was observed for those with PTSD (b=−.006, NS). There were no significant main or interaction effects involving attentional impulsivity on DDD.

4. Discussion

The current study examined the effects of motor, non-planning, and attentional impulsivity on number of drinks consumed when drinking among three groups of individuals: trauma exposed with PTSD, trauma exposed without PTSD, and a non-trauma exposed control group. The first hypothesis was that individuals higher in motor impulsivity would report more DDD, and this hypothesis was supported by the results. This finding is consistent with previously literature finding a significant relation between substance use and impulsivity traits linked to acting without thinking and a lack of forethought and deliberation (e.g., motor impulsivity; Adams et al., 2012; Grant & Chamberlain, 2014). We add to this work by finding that this effect is not moderated by trauma history and holds for those without trauma history, with trauma exposure but without PTSD, and those with PTSD. Towards the aim of preventing maladaptive alcohol use, it may be important to assess for motor impulsivity when intervening with young adults who present with a range of problems, including those seeking services for trauma-related symptoms, as well as non-trauma exposed individuals.

We also hypothesized that those higher on non-planning impulsivity would report more DDD, and that this effect would be stronger for those with PTSD. Although we did find a significant interaction between non-planning impulsivity and PTSD, it was in the opposite direction as expected. Specifically, higher levels of non-planning impulsivity were associated with more DDD for those *without* PTSD (there was no effect of non-planning impulsivity for those with PTSD). This finding may be explained in part by the fact that, although individuals with PTSD are at risk for maladaptive alcohol use (Stewart, Mitchell, Wright, & Loba, 2004), they may misuse alcohol for different reasons than those without PTSD. Indeed, Cloninger (1987) discusses two sub-types of alcohol misuse: one group who is impulsive, reckless, and easily bored (type 1), and another who experiences significant worry and anxiety and who report a sense of calm following alcohol use (type 2). It may be that those with PTSD are more similar to those in the second group. Specifically, prior work has found that individuals with PTSD drink alcohol in order to cope with negative emotions (i.e., self-medication; Dixon, Leen-Feldner, Ham, Feldner, & Lewis, 2009; Simpson, Stappenbeck, Luterek, Lehavot, & Kaysen, 2014). That is, they drink alcohol with the purpose of coping with their trauma-related anxiety symptoms. Thus, their alcohol use/misuse may be more intentional than the alcohol use/misuse of those without PTSD, whose alcohol use may be more driven by an inability to think about the consequences of their drinking behavior. Prior work should more precisely examine these potential multiple pathways into alcohol misuse for those with and without PTSD, via impulsive-related traits and premediated coping motives.

Finally, it was hypothesized that there would not be a significant association between attentional impulsivity and alcohol use, as prior studies have found no link between attentional impulsivity and alcohol-related outcomes (Giancola & Parker, 2001; Handley et al., 2011; Nigg, Wong, Martel, Jester, Puttler, Glass, et al., 2006). Our study's results aligned with this previous literature. Although attentional impulsivity may be related to other impulsivity-related traits that do confer risk for substance use (Handley et al., 2011), these findings support the idea that this construct capturing lack of perseverance does not uniquely predict alcohol misuse.

4.1 Strengths and Limitations

Despite several strengths, limitations are important to note. We were able to measure non-planning and attentional impulsivity that map onto lack of premeditation (i.e., difficulty thinking about consequences before acting; Whiteside, Lynam, Miller, & Reynolds, 2005) and perseverance (i.e., inability to remain focused on a boring or difficult task) respectively. However, we were unable to examine the impact of other impulsivity-related traits, including urgency and sensation seeking, which have been linked to alcohol use in prior work (Magid & Colder, 2007). Additionally, because individuals reported on their alcohol use, trauma history, and impulsivity at the same time point, we cannot confidently discern the temporal precedence between study constructs (e.g. increased impulsivity may precede or result from trauma history/PTSD and/or risk for alcohol use/misuse). In addition, with 90.8% of the sample self-reporting as Caucasian, these findings may not generalize to groups of other ethnicities. Finally, because individuals reported on all study constructs, there is certainly the potential for shared reporter bias and therefore, inflated relations among impulsivity, trauma history/PTSD, and DDD.

4.2 Conclusion

The current study adds to prior literature in several ways. First, the current study supports prior work finding that those with high levels of motor impulsivity, regardless of trauma history, are a particularly high-risk group in terms of propensity for alcohol misuse. This may be an area of focus for prevention/intervention efforts. Specifically, a goal of treatment for individuals reporting traits or mental health problems involving high motor impulsivity would be to teaching them to inhibit their initial response before making important decisions (e.g., deciding whether or not to drink alcohol, or how much to drink). Second, findings suggest that for individuals without PTSD, non-planning impulsivity may be a useful target for intervention efforts aimed at reducing risk for problematic alcohol use. Therefore, for individuals without PTSD who report traits or mental health problems involving high non-planning impulsivity, one method of intervening may be to work with individuals to consider not only the immediate but the longer-term consequences of their alcohol use so that they do not misuse alcohol. Finally, attentional impulsivity is not influential in risk for alcohol use among adults, and adds to this work by finding that this effect holds regardless of trauma history.

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APPENDIX A. ITEM LIST

Motor Impulsivity

1. I act “on impulse.”
2. I act on the spur of the moment.
3. I buy things on impulse.
4. I make up my mind quickly.
5. I do things without thinking.
6. I spend or charge more than I earn.
7. I change residences.
8. I change jobs.

Omitted items

1. I am happy-go-lucky.
2. I am future-oriented.
3. I can only think about one problem at a time.

Non-Planning Impulsivity

1. I am a careful thinker.
2. I plan tasks carefully.
3. I am self-controlled.
4. I plan trips well ahead of time.
5. I plan for job security.
6. I say things without thinking.
7. I like to think about complex problems.
8. I save regularly.
9. I am more interested in the present than the future.

10. I get easily bored when solving thought problems.

Omitted item

1. I like puzzles.

Attentional Impulsivity

1. I “squirm” at plays or lectures.
2. I am restless at the theater or lectures.
3. I don’t “pay attention.”
4. I don’t concentrate easily.
5. I often have extraneous thoughts when thinking.
6. I have “racing” thoughts.
7. I change hobbies.

Omitted item

1. I am a steady thinker.

Highlights

- More motor impulsivity was associated with more drinks/drinking day (DDD).
- The effect of motor impulsivity holds for those with and without trauma and PTSD.
- More non-planning impulsivity was associated with more DDD.
- The effect of non-planning impulsivity only held for those without PTSD.
- There was no association between attentional impulsivity and DDD.

Table 1

Descriptive statistics.

Variable Name	Observed Min.	Observed Max.	Mean (SD)	Skew	Kurtosis
Young Adult Age	21	30	24.70 (2.59)	.389	−.842
Motor Impulsivity	8	31	15.67 (3.63)	.737	1.063
Attentional Impulsivity	7	27	13.19 (3.76)	.790	.579
Non-Planning Impulsivity	10	37	20.68 (4.96)	.523	.450
Drinks per Drinking Day	1.20	19.02	4.52 (3.05)	2.12	5.48
Drinks per Drinking Day (log transformed)	.04	1.28	.525 (.26)	.32	−.207
Variable Name					**%**
Group					
PTSD					29.5
Trauma Exposed					35.0
Control					35.4
Gender					
Female					59.5
Male					40.6
Race					
Caucasian					90.2
African-American					9.8
Parental Alcohol Problem					
Endorsed parental alcohol problem					33.9
Did not endorse parental alcohol problem					66.1

Table 2

Correlations among study variables (N=254).

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Drinks per drinking day (log transformed)	--								
2. Age	−.057	--							
3. Gender	.397***	−.117†	--						
4. Race	.105	.009	.112†	--					
5. Parent Alcohol Problem	.036	−.011	.051	.031	--				
6. Dummy Code 1: Control vs TE/PTSD	−.110†	.039	.025	−.055	.177*	--			
7. Dummy Code 2: Control/TE versus PTSD	.106	−.057	−.007	.112†	−.117†	−.479***	--		
8. Motor Impulsivity	.272**	.057	.075	.013	.154*	−.260***	.225**	--	
9. Attentional Impulsivity	.113†	−.034	−.075	−.055	.163*	−.192**	.343***	.512***	--
10. Non-Planning Impulsivity	.219**	−.009	−.035	.032	.079	−.156*	.246**	.599***	.565***

Notes:

† p<.1,

* *p*<.05,

** *p*<.01,

*** *p*<.001.

Higher scores on all constructs correspond to higher values; 0=females, 1=males; 0=Caucasian, 1=African-American; 1=parent alcohol problem, 0=no parent alcohol problem.

Table 3

Ordinary Least Squares Regression Model Results; Predictors of Log Transformed Drinks per Drinking Day (N=254).

Predictor	Standardized B	SE
Age	−.019	.061
Gender	.359***	.059
Race	−.069	.062
Parent AUD	−.063	.061
Dummy Code 1: Control vs TE/PTSD	−.071	.072
Dummy Code 2: Control/TE vs PTSD	.068	.069
Attentional IMP	−.082	.080
Motor IMP	.185*	.077
Non-Planning IMP	.312**	.096
Non-Planning IMP X Dummy Code 2	−.255**	.079

Notes.

* $p<.05$,

** $p<.01$,

*** $p<.001$.

B= *S*tandardized regression coefficient. *SE*= Standard error. Higher scores on all constructs correspond to higher values; 0=females, 1=males; 0=Caucasians, 1=African-Americans.